Annual DCCC report 2020

Cathrine Bang Overgaard, PhD Student, Experimental Clinical Oncology, AUH

Title: *Preclinical* relative biological effectiveness (*RBE) in normal tissue damage established in animal models.*

Short introduction: The current project concerns the biological changes in normal tissue post proton vs. 6MV X-ray radiotherapy. It aims to answer and verify the so far *in vitro*-verified increased biological effect towards the distal edge of the proton dose-distribution curve on acute and late adverse events induced after single or multiple fractions.

Methods: The right hindlimb of mice is irradiated with different doses to generate full dose-response curves. During follow-up the severity of two different endpoints are graded - acute skin-damage from day 7 to 30 and fibrosis up to 12 months post radiation.

Study I: methods paper in progress regarding the experimental setup and pilot study results.	**Study II:** the distal edge effect and the RBE on acute and late normal tissue damage induced by single doses.	**Study III**: the distal edge effect and RBE on late normal tissue damage upon fractionation.

2020:

We have obtained acute normal tissue damage results for mice irradiated with a single fraction with protons in the center and distal edge of the Spread-out Bragg Peak (SOBP) and with 6MV photons.

The ED50 values (the dose to produce acute skin damage in 50% of the mice) for full dose-response curves generated in the center of SOBP are: 35.80Gy (34.79;36.82), at the distal edge: 33.15Gy (31.94;34.36) and on the clinical LINAC: 37.53Gy (36.17;38.89). It translates into an RBE of 1.05 (-4.60% proton dose, not significant) between center SOBP and photons and an RBE of 1.13 (-11.7% proton dose, significant) between distal edge of SOBP and photons. Furthermore, they showed an RBE of 1.08 (-7.4% proton dose, significant) between center and distal edge SOBP.

Currently, mice are being irradiated in a clinically relevant fractionation-scheme in the center of the SOBP (October to December 2020).

The data for the late side effects for both single and multiple fractions are obtained during 2021. The plan is also to irradiate mice in a fractionated-scheme similar to the study currently going on, but at the distal edge.

During 2020 two grands have been obtained from AP. Møller Fonden and Helga and Peter Kornings Fond.

An abstract for ESTRO 2021 is in the making.